

Shenzhen Xinkotech Semiconductor Co., Ltd.

Floor 9, Building A, Jiabao Industrial Park, Longtian Community, Longtian Street,

Pingshan District, Shenzhen Company website: www.liucr.com 、 www.xktbdt.com

E-mail: 492332990@qq.com / liuchangrong@xktbdt.com / liulongjiao@xktbdt.com

Tel: 0755-84533145

XKT-R03

Single chip wireless power receiving chip

regulation

grid

Book

XKT-R03Single chip wireless power receiving chip

Wireless charging and power supply chip

1. Overview

The XKT-R03 chip is a new wireless charging receiving solution launched by Shenzhen Xinketai Semiconductor. This solution is directly used for charging 4.2V lithium batteries. The working input voltage is 5V to 25V, and the output voltage is 4.3V (needs to be measured with a capacitive load). The chip adopts SOT23-6 package and is small in size. With fewer peripheral devices, the size of the finished product can be further compressed, and the production process and cost can be further optimized.

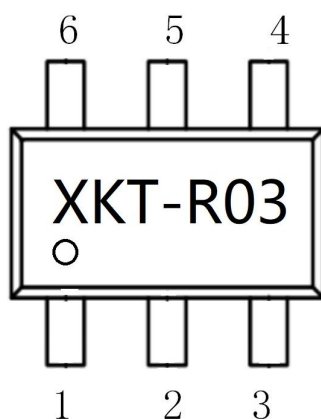
2. Features

- * Small size, packaged in SOT23-6
- * High integration, few peripheral devices
- * Output current 150mA (limit 300mA)
- * Wide range of applications
- * Operating voltage: 5~18V
- * The coil can be realized by printed PCB board

3. Scope of application

It can be used for battery charging and wireless direct power supply of electric toothbrushes, beauty instruments, hydrating instruments, embedded product power supply, medical products, security products, waterproof products, toy products, adult products, digital products, LED, mining equipment, handheld household appliances, etc.

4. Pinout and description



Pin Number	Pin Name	Withstand voltage (V)	Functional Description
1	NG	-	Dangling feet
2	IN	-	Power Input
3	NG	-	Dangling feet
4	GND	-	Power Ground
5	TX	-	Test pin, usually hanging
6	OUT	-	Output 4.3V

Note: This chip is a receiving chip. The circuit parameters need to be designed in conjunction with the transmitting circuit used before it can be used.

5. Chip usage instructions

Since the wireless charging industry is an emerging industry, product design is very different from traditional electronic product design. Therefore, if you are not very familiar with the wireless charging circuit, please design the circuit strictly according to the usage method. Do not change the working mode and parameters of the product without permission. If you need to optimize or redesign the circuit, please complete it under the guidance of the supplier's engineer. The company does not assume any responsibility for the risk of mass production caused by customers' unauthorized modifications.

When designing a product, the material of the capacitor is an extremely important parameter (NPO material is used by default). Be sure to pay attention to the devices with marked materials and do not use other materials or packages to replace them at will! (In order to save costs, the following will guide how to use M3L material, X7R material

or CBB material as an alternative)

In the selection of coils, since the coil parameter collection is measured using our company's bridge, the bridge parameters of different coil manufacturers have certain deviations, which will lead to inaccurate inductance after the sample is obtained, resulting in a large deviation after the circuit is made. The best state is to get the coil sample of our company and send it to the coil supplier for actual measurement before making a sample test. If it is a direct sample, please refer to the following post-design test method for your own judgment. In the selection of coil materials, the thicker the wire diameter, the greater the power that can be designed. The larger the outer diameter area of the coil, the greater the output power and the farther the distance; the fewer the coil layers, the better the output effect. In the selection of wire materials: multi-strand wire is better than yarn-wrapped wire, and yarn-wrapped wire is better than ordinary enameled wire. Among them, yarn-wrapped wire has the highest voltage resistance and multi-strand wire has the lowest voltage resistance. When using printed PCB as a coil, since the inductance made by PCB is very difficult to determine, try to use the standard PCB coil sample provided by our company for design. When designing, pay attention to the line width, copper thickness, PCB board thickness, etc., which will affect the inductance and output power.

About the selection of magnetic shielding sheets. The material of wireless charging magnetic shielding sheets generally uses ferrite materials as magnetic shielding materials, which are divided into soft magnetic and hard magnetic materials on the market. When the magnetic shielding sheet is directly attached to the coil, the inductance of the coil will increase. The value of the increase in inductance is related to the material of the magnetic sheet and is proportional to the area covering the coil (our company's modules usually do not add magnetic shielding sheets). Therefore, when referring to the inductance of a coil, if a magnetic shielding sheet is needed as a shield, the inductance after adding the magnetic shielding sheet should be used as a reference value for calculation. (When making a request to the coil factory, you can ask them to use the inductance after the magnetic shielding sheet is attached as the value you need. The magnetic sheet materials used by the coil factory are generally of better quality). If you add a magnetic shielding sheet to the coil yourself, the inductance will increase after the magnetic shielding sheet is added. At this time, the coil itself needs to be removed a few turns to keep the inductance unchanged. If there is a bridge, you can use the bridge to measure and disassemble it.

The significance of setting the closest use distance: In order to increase the use distance, the power of the module has been enhanced. The closer the distance, the greater the output power and the higher the peak voltage. If the distance is too close, there is a certain probability that the low-voltage components will be broken down. (When the product is designed, the shell will have a certain thickness, so the use distance needs to be increased. If you need to use it at a closer distance, please contact the supplier and make modifications under the guidance of the supplier.)

Determine the nearest distance: If the circuit is adjusted, the distance between the coils will change accordingly. The method of judgment is to power on the transmitter, remove the power part of the receiver, and place it close to the transmitter coil without load. The static current of the transmitter will change accordingly. At this time, the static current of the transmitter reaches 150mA, and the distance at this time is the nearest distance. If it is closer, there is a risk of damaging the device. (150mA is just an empirical value. The main judgment standard is to work for a long time and test whether the chip temperature is too high.)

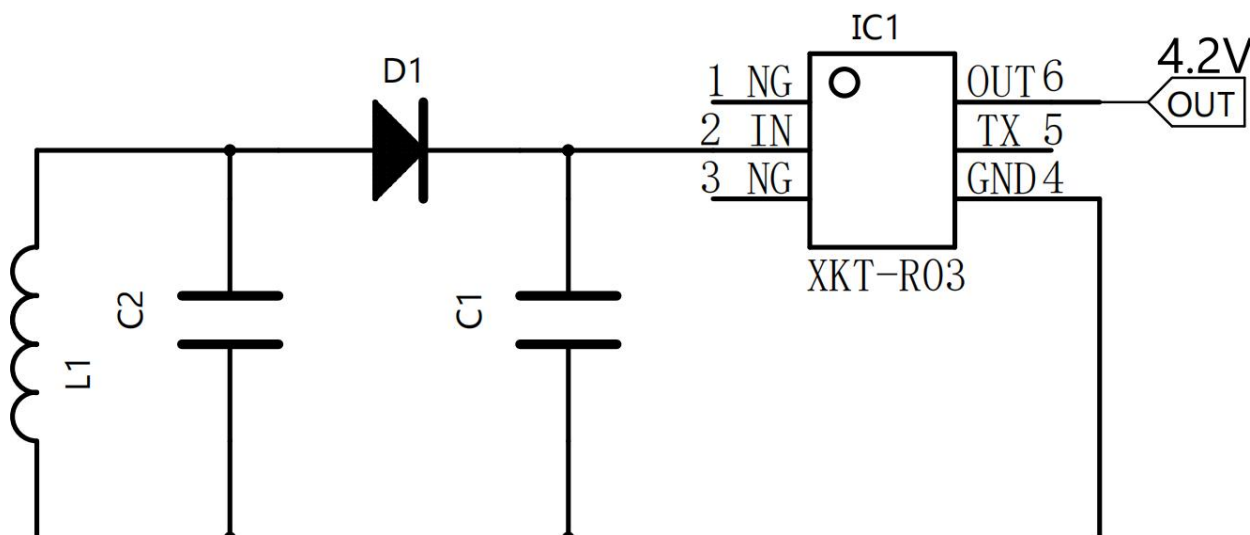
6. Typical circuit design

Sequence in circuit design:

Design the transmitting circuit first, and then design the receiving circuit after the transmitting circuit design is stable. Then test the transmitting circuit and receiving circuit together without load. After the test is stable, test with load. After all the above tests are up to standard, it is the aging test, and then trial production, and finally the mass production process. Transmitter circuit design method and requirements:

Please strictly follow the circuit design when making the transmitting circuit. The materials of the circuit components cannot be replaced at will. The packaging of the resistor can be selected according to your own requirements. If the value of the components in the circuit is modified, all the test methods provided in this specification will become invalid.

Standard circuit:



Device List:

Device location	Device Type	Device parameters	Device packaging	Remark	Device location	Device Type	Device parameters	Device packaging	Remark
C1	capacitance	10uF	0805	X7R	IC	chip	XKT-R03	SOT23-6	
C2	capacitance	Power debugging circuit Capacitor, and transmitter Road coordination value		NPOMaterial	L1	Coil	Coordinated launch Circuit Value		Subject to actual situation
D1	Schottky II Pole	IN5819	0805						

7. Principles of capacitor replacement

Note: If you want the highest stability, NPO capacitors are preferred.

Use NPO capacitors.

Since many guests privatelyNPOReplace the capacitor withX7RThe material has caused many quality problems in the product. The following is an explanation of the precautions for replacement. Note: According to the design requirements of our company, there are requirements to useNPOIt is strongly recommended not to replace capacitors with other materials. If you are very sensitive to cost, you can useM3LMaterial, orCBBCapacitors (polypropylene film capacitors) are used as replacements.

M3LMaterial:M3LThe capacitor is a domestic imitationNPOCapacitors with the best performance, the electrical performance is closest toNPOMaterial capacitors, if you are sensitive to product cost and pursue better circuit performance, the first choice isM3LMaterial.

CBBCapacitor (polypropylene film capacitor):NPOThe same capacitor, also a high frequency capacitor, the use effect is the sameNPOThe difference is thatNPOIt is a high-frequency ceramic capacitor, resistant to high temperatures, with SMD packaging, and easy to produce.CBBThe capacitor is a film capacitor, which is not resistant to high temperatures, so it is only available in plug-in packaging and requires soldering during production.CBBCapacitors are thin-film organic materials that are not resistant to high temperatures, so the time in the tin furnace must not be too long, or the soldering temperature must not be too high, and the soldering time must not be too long, otherwise the pins of the capacitor will fall off internally and cause damage to the chip. (When purchasingCBBWhen measuring capacitors, because there are many types of film materials, they are very confusing. The material must be polypropylene, and when measuring on the bridgeDThe value (loss angle) must be less than10The reference value is3about.)

In theNPOCapacitor replaced byX7RPay attention to the capacitance, becauseX7RThe internal resistance of the capacitor is large and the heat generated is large, so when the output current is greater than300mAYou can't useX7RCapacitors. Thermal expansion and contraction can cause the capacitor to deform. During mass production, the capacitor may break due to thermal expansion and contraction, causing circuit failure.X7RWhen the package must be1206And above the package,**And it must be a thick package**,When the current is relatively large, multiple capacitors can be connected in parallel to achieve the maximum capacity to disperse the heat. In addition, the copper on both sides of the capacitor and nearby needs to be widened and laid copper to ensure good heat dissipation so that the temperature of the capacitor can be effectively controlled.

X7RSince the capacitor is a conventional capacitor, there are many kinds of precision. Since the capacitance deviation of the capacitor used in wireless charging will have a great impact on the circuit, the error of the capacitor should be selected with very high precision (NPOThe capacitance error is5%). Otherwise, the product consistency will be very poor during mass production, and the general precision error cannot be higher than10%above.

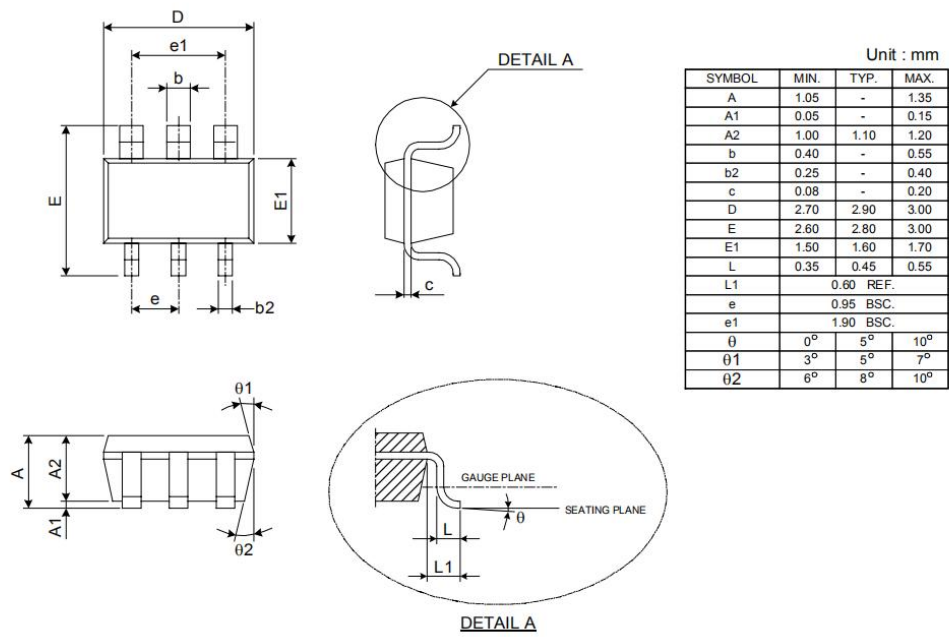
becauseX7RThe relationship between the internal resistance loss of the capacitor and the direct replacement of the material will lead to an increase in the static current, and the final value cannot exceed100mA!

8. Working Limits

- Operating temperature: -55°Cto+125
- Storage Temperature:14°C
- Maximum operating voltage:25V
- Minimum operating voltage:5V
- Chip current resistance:150mA
- Maximum receiving output current:300mA

9. Packaging

Package Outline



SOT23-6Encapsulation